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## **Oribatid mites (Acari: Oribatida) of Mashhad township, Razavi Khorasan province, Iran**

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**A b s t r a c t :** In the course of a faunistic survey of oribatid mites in Mashhad township (northeast of Iran), which conducted during 2013-2014, totally, 74 species belonging to 58 genera and 41 families were collected and identified. Of which, one species is reported for the first time from Iran, and 71 species are reported for the first time from Razavi Khorasan province.

**K e y w o r d s :** Acari, Sarcoptiformes, fauna, Iran.

### **Introduction**

During 2013-2014, oribatid mite fauna of Mashhad township was studied. Mashhad with 328 square kilometers, is the second most populous city in Iran and capital of Razavi Khorasan province. It is located in the northeast of the country, close to the borders of Turkmenistan and Afghanistan. The city is located at 36.20° North latitude and 59.35° East longitude, in the valley of the Kashafrud River near Turkmenistan, between the two mountain ranges of Binalood and Hezar Masjed Mountains. The city benefits from the proximity of the mountains, having cool winters, pleasant springs, mild summers, and beautiful autumns. The weather in Mashhad is temperate and variable. Winds are more in the southeast in comparison with northwest. Maximum temperature of 43 degrees above zero in summer and lowest in winter is 23 degrees below zero were seen in Mashhad.

### **Materials and methods**

Soil and litter samples were taken from the area around the Mashhad township during 2013 - 2014. The samples were obtained from variety habitat types such as: soil around the plants, fruit trees, pastures, weeds, inside the trunk trees and moss, and then were transferred to the Acarological laboratory of Shiraz University. The mites were extracted by Berlese funnel apparatus. Oribatid mites were removed and been cleared in lactophenol and mounted in Hoyer's medium on glass microscope slides for identification. The slides were placed in an oven at 45°C for 10 days and then the specimens were recognized using a light microscope (Zeiss Standard 20).

## Results

During this study, 74 species belonging to 58 genera and 41 families of oribatid mites from various habitats of Mashhad township were collected and identified, of which one species are reported for the first time from Iran (marked by one asterisk), and 71 species are reported for the first time from Razavi Khorasan province (marked by two asterisks). The Sample Codes below refer to Table 1.

### **Hypochthoniidae BERLESE, 1910**

*Hypochthonius luteus* OUDEMANS, 1917\*\*: I<sub>1</sub> -H<sub>3</sub>-C -E<sub>2</sub>

### **Cosmochthoniidae GRANDJEAN, 1947**

*Cosmochthonius (C.) asiaticus* GORDEEVA, 1980\*\*: K<sub>2</sub>

*Cosmochthonius (C.) ponticus* GORDEEVA, 1980\*\*: K<sub>3</sub>

*Cosmochthonius (C.) lanatus* (MICHAEL 1885)\*\*: K<sub>2</sub>

*Cosmochthonius (C.) reticulatus* GRANDJEAN, 1947\*\*: E<sub>3</sub>

### **Haplochthoniidae HAMMEN, 1959**

*Haplochthonius (H.) simplex* (WILLMANN, 1930)\*\*: P1-H2-B3

### **Sphaerochthoniidae GRANDJEAN, 1947**

*Sphaerochthonius splendidus* (BERLESE, 1904)\*\*: R- H<sub>4</sub>-C-E<sub>2</sub>

### **Brachychthoniidae THOR, 1934**

*Eobrachychthonius* sp. nr. *similis* MAHUNKA, 1979\*\*: U -D<sub>2</sub>-E<sub>2</sub>

### **Mesoplophoridae EWING, 1917**

*Mesoplophora michaeliana* BERLESE, 1904\*\*: I-H<sub>4</sub>-D<sub>3</sub>-B<sub>4</sub>-E<sub>2</sub>

### **Euphthiracaridae JACOT, 1930**

*Acrotrititia ardua* (KOCH, 1841): N<sub>1</sub>-G<sub>1</sub>-I<sub>2</sub>-P-J-C-F-E

### **Phthiracaridae PERTY, 1841**

*Phthiracarus (Archiphthiracarus) furvus* NIEDBALA, 1983\*\*: N<sub>2</sub> -G<sub>1</sub> -H<sub>3</sub>-F<sub>2</sub>

*Notophthiracarus (Calypthophthiracarus) pavidus* (BERLESE, 1913)\*\*: E

*Steganacarus (Tropacarus) brevipilus* (BERLESE, 1923)\*\*: K<sub>4</sub>

*Atropacarus striculus* (KOCH, 1835)\*\*: G-I-H-D-C-A-F-K-E

### **Lohmanniidae BERLESE, 1916**

*Lohmannia (L.) paradoxa* (HALLER, 1884)(= *Lohmannia loebli* MAHUNKA, 1974)\*\*: M

*Lohmannia (L.) turcmenica* BULANOVA-ZACHVATKINA, 1960\*\*: E

*Papillacarus pseudoaciculatus* MAHUNKA, 1980\*\*: B<sub>2</sub>

**Epilohmanniidae OUDEMANS, 1923**

*Epilohmannia cylindrica cylindrica* (BERLESE, 1904)\*\*: N3-W-P1 -C-E2-A5

**Perlohmanniidae GRANDJEAN, 1954**

*Perlohmannia* (*P.*) *dissimilis* (HEWITT, 1908)\*\*: W -H1 -A4-K3

**Nothridae BERLESE, 1896**

*Nothrus borussicus* SELLNICK, 1928\*\*: A1

*Nothrus* sp.: O-G1-H2-C-A4-F1-K2

**Crotoniidae THORELL, 1876**

*Camisia* (*C.*) *horrida* (HERMANN, 1804)\*\*: D3

**Malaconothridae BERLESE, 1916**

*Trimalaconothrus* sp.\*\*: E3- I2

**Hermanniellidae GRANDJEAN, 1934**

*Hermanniella* sp nr. *grandis* SITNIKOVA, 1973\*\*: E<sub>2</sub> -K<sub>3</sub>-F<sub>2</sub>-C-H<sub>2</sub>-I-G<sub>2</sub>

**Gymnodamaeidae GRANDJEAN, 1954**

*Jacotella frondeus* (KULIJEV, 1979)(=*Plesiodamaeus ornatus* MAHUNKA, 1979)\*\*: K1

**Aleurodamaeidae PASCHOAL and JOHNSTON, 1985**

*Aleurodamaeus setosus* (BERLESE, 1883)\*\*: E1

**Licnodamaeidae GRANDJEAN, 1954**

*Licnodamaeus pulcherrimus* PAOLI, 1908\*\*: E2-D1-G1-N1

*Licnodamaeus inaequalis* (BALOGH&MAHUNKA, 1965)\*\*: K3-U

*Licnodamaeus* sp.:W -E

**Licnobelbidae GRANDJEAN, 1965**

*Licnobelba latiflabellata* (PAOLI, 1908)(=*Licnobelba alestensis* GRANDJEAN, 1931)\*\*: W

**Eremulidae GRANDJEAN, 1965**

*Eremulus avenifer* BERLESE, 1913\*\*: R

**Damaeolidae GRANDJEAN, 1965**

*Fosseremus laciniatus* (BERLESE, 1905)(=*Fosseremus quadripertitus* GRANDJEAN, 1965)\*\*: E3-K5

**Amerobelbidae GRANDJEAN, 1961**

*Amerobelba* sp. nr. *decedens* BERLESE, 1908\*\* :U-B4-A6-F2-E

### **Damaeidae BERLESE, 1896**

*Belba* sp. 1\*\*: E-K-F-A-C-J-D-H-R-I-G-V

*Belba* sp. 2: K<sub>1</sub>

### **Eremaeidae OUDEMANS, 1900**

*Eueremeus* sp.\*\*: V-G-H-A-F

### **Zetorchestidae MICHAEL, 1898**

*Zetorchestes* sp.\*\*: A

### **Tectocephidae GRANDJEAN, 1954**

*Tectocephus velatus* (MICHAEL, 1880)\*\*: E-K-A-C-B-R-U-N-V

*Tectocephus minor* BERLESE, 1903\*\*: N-M-F-E

*Tectocephus alatus* BERLESE, 1913\*\*: G

### **Oppiidae SELLNICK, 1937**

*Oppiella* (*O.*) *nova* (OUDEMANS, 1902)\*\*: A-B-E

*Lasiobelba* (*Antennoppia*) *heterosa* (WALLWORK, 1964)\*\*: P1

*Oppia denticulata* (G. & R. CANESTRINI, 1882)\*\*: F-A-D-H-I-G-N

*Microppia minus minus* (PAOLI, 1908)\*\*: E-K

*Rhinoppia* (*Bipectinoppia*) *biplectinata* (AKRAMI&SUBÍAS, 2007)\*\*: E4– A2-B4-H2-G2

*Rhinoppia* (*R.*) *subpectinata* (OUDEMANS, 1900)\*\*: N-H-A-F-K-E

*Ramusella puertomontensis* HAMMER, 1962\*\*: E-F-D-R-I

*Anomaloppia differens* MAHUNKA & TOPERCER, 1983\*\*: N-D-A-K-E

*Anomaloppia iranica* BAYARTOGTOKH&AKRAMI, 2000\*\*: U-E

*Multioppia wilsoni* AOKI, 1964\*\*: E1-I4

### **Epimerellidae AYYILDIZ&LUXTON, 1989**

*Epimerella smirnovi* (KULJEV, 1962)\*\*: E

### **Autognetidae GRANDJEAN, 1960**

*Rhaphigneta* sp.\*\*: M2

### **Suctobelbidae JACOT, 1938**

*Suctobelbella* (*S.*) *acutidens pilosetosa* SHTANCHAEVA&SUBÍAS, 2009\*\*: B-W

*Flagrosuctobelba* sp.\*\*: W

### **Haplozetidae GRANDJEAN, 1936**

*Baloghiella granulata* BAYARTOGTOKH&AKRAMI, 2000\*\*: K-H

### **Oribatulidae THOR, 1929**

*Oribatula (O.) tibialis tibialis* (NICOLET, 1855)\*\*: E-K-F-A-H-D-B-I-G-U-W -V

*Oribatula (Zygoribatula) undulata* BERLESE, 1916\*\*: U-P1-M

*Oribatula (Z.) skrzjabini* (BULANOVA-ZACHVATKINA, 1967)\*\*: E4 -K-J-D

*Oribatula (Z.) connexa* BERLESE, 1904: A3-B3-C-D3-M2-V

### **Hemileiidae J. & P. BALOGH, 1984**

*Hemileius (Simkinia) ovalis* KULIJEV, 1968 (= *Turcibates parvus* AYYILDIZ & LUXTON, 1989)\*\*: K5-Q-P2.

### **Scheloribatidae GRANDJEAN, 1933**

*Scheloribates (S.) fimbriatus* THOR, 1930: N3-P1

*Scheloribates (S.) laevigatus* (KOCH, 1835)\*\*: E-K-Q-D-H-R-M-G-N

### **Protoribatidae J. & P. BALOGH, 1984**

*Liebstadia (L.) similis* (MICHAEL, 1888)\*\*: W

*Protoribates (P.) paracapucinus* (MAHUNKA, 1988)\*\*: V-N4-W-G1-I2-H1-P1-A5-F2-E3

### **Ceratozetidae JACOT, 1925**

*Trichoribates* sp.\*\*: W

*Ceratozetes* sp.\*\*: E1-P1

### **Punctoribatidae THOR, 1937**

*Punctorbates (P.) liber* PAULITCHENKO, 1991\*\*: W-I1-D2-E3

*Minunthozetes (M.) semirufus* (KOCH, 1841)\*\*: E3-N4

### **Chamobatidae THOR, 1937**

*Chamobates (Xiphobates) sergienkoe* SHALDYBINA, 1980\*\*: E2

### **Achipteriidae THOR, 1929**

*Parachipteria* sp.\*\*: A

### **Oribatellidae JACOT, 1925**

*Oribatella (O.) krivolutskyi* KARPPINEN & SHTANCHAEVA, 1987\*: E3

Note: This is the first record of this species for Iran.

### **Galumnidae JACOT, 1925**

*Galumna (G.) sp. nr. tarsipennata* OUDEMANS, 1914\*\*: G-H-D-A-F-K-E

*Acrogalumna lanceolaata* BAYARTOGTOKH & AKRAMI, 2014\*\*: E3-L

*Pergalumna iunctiporosa* BAYARTOGTOKH & AKRAMI, 2014\*\*: V

Table 1: Sampling information in Mashhad township

Code	Latitude		Longitude		Altitude (m)	Habitat (Soil of)	Sampling Date	Sampling Location	
	Degree	Minutes	Degree	Minutes					
A1	36	11	59	19	1684	River	8/8/2013	Riverside	Azghad
A2	36	11	59	19	1684	<i>Urtica dioica</i>	8/8/2013	Riverside	Azghad
A3	36	11	59	19	1684	<i>Mentha pulegium</i>	8/8/2013	Riverside	Azghad
A4	36	11	59	19	1684	<i>Rosa damascena</i>	1/7/2014	Riverside	Azghad
A5	36	11	59	19	1684	<i>Juglans regia</i>	1/7/2014	Garden	Azghad
A6	36	11	59	19	1684	<i>Cerasus avium</i>	1/7/2014	Riverside	Azghad
A7	36	11	59	19	1684	<i>Malus domestica</i>	1/7/2014	Garden	Azghad
A8	36	11	59	19	1684	Soil	1/7/2014	Hillside	Azghad
B1	36	12	59	22	1518	<i>Populus alba</i>	13/5/2014	Hillside	Mayan
B2	36	12	59	22	1518	Moss	13/5/2014	Riverside	Mayan
B3	36	12	59	22	1518	<i>Morus alba</i>	13/5/2014	Riverside	Mayan
B4	36	12	59	22	1518	River	13/5/2014	Riverside	Mayan
B5	36	12	59	22	1518	<i>Juglans regia</i>	13/5/2014	Riverside	Mayan
C	36	14	59	17	1632	Soil	26/5/2013	Riverside	Dehyar
D1	36	18	59	19	1441	Weeds	26/3/2014	Hillside	Jaghraq
D2	36	18	59	19	1441	Moss	26/3/2014	Riverside	Jaghraq
D3	36	18	59	19	1441	Soil	26/3/2014	Riverside	Jaghraq
E1	36	18	59	10	1824	Weeds	23/9/2013	Hillside	Zoshk
E2	36	18	59	10	1824	Moss	28/4/2014	Riverside	Zoshk

Code	Latitude		Longitude		Altitude (m)	Habitat (Soil of)	Sampling Date	Sampling Location	
	Degree	Minutes	Degree	Minutes					
E3	36	18	59	10	1824	<i>Cerasus avium</i>	28/4/2014	Garden	Zoshk
F1	36	18	59	13	1713	Soil	1/9/2013	Riverside	Kang
F2	36	18	59	13	1713	litter	1/9/2013	Riverside	Kang
F3	36	18	59	13	1713	<i>Cerasus avium</i>	1/9/2013	Garden	Kang
F4	36	18	59	13	1713	Weeds	1/9/2013	Riverside	Kang
G1	36	29	59	17	1408	Moss	15/6/2014	Riverside	Noghondar
G2	36	29	59	17	1408	Soil	15/6/2014	Garden	Noghondar
H1	36	29	59	17	1443	<i>Populus alba</i>	2/5/2014	Riverside	Kahoo
H2	36	29	59	17	1443	Moss	2/5/2014	Riverside	Kahoo
H3	36	29	59	17	1443	<i>Morus alba</i>	2/5/2014	Garden	Kahoo
H4	36	29	59	17	1443	Soil	27/6/2013	Riverside	Kahoo
I1	36	23	59	14	1418	litter	23/9/2013	Riverside	Aabradeh
I2	36	23	59	14	1418	Weeds	23/9/2013	Riverside	Aabradeh
I3	36	23	59	14	1418	Soil	19/6/2014	Hillside	Aabradeh
I4	36	23	59	14	1418	Moss	19/6/2014	Riverside	Aabradeh
J	36	45	59	27	1479	Soil	30/7/2013	Riverside	Abghad
K1	36	29	58	56	1745	<i>Pistacia atlantica</i>	27/6/2014	Hillside	Frizy
K2	36	29	58	56	1745	Moss	27/6/2014	Riverside	Frizy
K3	36	29	58	56	1745	Soil	27/6/2014	Garden	Frizy
K4	36	29	58	56	1745	<i>Juglans regia</i>	27/6/2014	Riverside	Frizy
K5	36	29	58	56	1745	<i>Prunus avium</i>	27/6/2014	Garden	Frizy

Code	Latitude		Longitude		Altitude (m)	Habitat (Soil of)	Sampling Date	Sampling Location	
	Degree	Minutes	Degree	Minutes					
L	36	38	59	39	1291	<i>Salix alba</i>	31/8/2014	Riverside	Kardch
M1	36	44	59	40	1761	Moss	30/3/2014	Riverside	Aal valley
M2	36	44	59	40	1761	Soil	30/3/2014	Riverside	Aal valley
N1	36	04	59	58	927	<i>Goldbachia laevigata</i>	30/5/2014	Farm	Aabravan
N2	36	04	59	58	927	<i>Peganum harmala</i>	30/5/2014	Farm	Aabravan
N3	36	04	59	58	927	Lawn	30/5/2014	Farm	Aabravan
N4	36	04	59	58	927	Soil	30/5/2014	Wheat field	Aabravan
O	36	18	59	22	1311	Soil	4/4/2014	Hillside	Torghabe
P1	36	24	59	13	1463	<i>Morus alba</i>	2/5/2014	Riverside	Gorakhk
P2	36	24	59	13	1463	Weeds	2/5/2014	Wheat field	Gorakhk
Q	36	27	59	03	1572	<i>Malus domestica</i>	11/7/2013	Garden	Paye
R	36	06	59	33	1435	Soil	27/7/2013	Riverside	Arefi
U	35	29	59	37	1279	Moss	4/4/2014	Hillside	Mashhad road
V	36	59	59	45	901	Soil	25/8/2014	Riverside	Kalat Nadery
W	36	12	59	55	995	<i>Medicago sativa</i>	9/8/2014	Alfalfa field	Sarakhs road



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